



OBSERVATIONS

ON THE

BAROMETER.

J. Henson



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Advertisement.

AS many of my Friends and Customers have express'd their Wishes to be furnished with Observations on the BAROMETER, in order to judge more accurately of the Changes of the Weather, and also of the Cause of those Changes; I have herewith selected some of the best that are to be met with; which I present GRATIS to my numerous Customers, for their further Assistance in observing this useful Instrument.

John Stenson.

DERBY, Oct. 21, 1782.

OBSERVATIONS
ON THE
BAROMETER.

THE principal Use of the BAROMETER is, to estimate the Gravity of the Air at different Times, in order to foresee the Alterations of the Weather which are consequent thereon. To this End, Dr. *Halley* in the Philosophical Transactions No. 181, has laid down the most remarkable *Phænomena*, relating to the different Heights of the Mercury at different Times, together with the Solution of each; which are so just, and so agreeable to true Philosophy, that I doubt not but the Reader will excuse me for giving his Account in his own Words, rather than to render it imperfect, by endeavouring to vary from it, or abridge it.

“ 1. In calm Weather, when the Air is inclined
“ to Rain, the Mercury is commonly low. *

* Part of the Air being carried away by contrary Winds blowing from the same Place, the Remainder becomes too light to buoy the Vapours up, and so the upper ones, in all Probability, precipitate down upon the lower ones, unite with them, and form Drops of Rain.—A remarkable Instance we have of this, in that Part of the *Atlantic Ocean*, which the Sailors call the *Rains*, from the continual Rains that fall there. It is situate to the Northward of the Line, between four and ten Degrees of Latitude, and between the Meridians of *Cape Verde*, and of the easternmost Islands that bear that Name: It seems condemned to perpetual Calms, attended with terrible Thunder and Lightning; and rains so frequent, that our Navigators from thence call this Part of the Sea, the RAINS,

“ 2. In

“ 2, In serene, good, and settled Weather, the
“ Mercury is generally high.

“ 3. Upon very great Winds, though they be not
“ accompanied with Rain, the Mercury sinks lowest
“ of all, with Relation to the Point of the Compass
“ the Wind blows upon.

“ 4. *Cæteris Paribus*, the greatest Heights of the
“ Mercury are found upon easterly and north-easterly
“ Winds.

“ In calm frosty Weather, the Mercury generally
“ stands high.

“ 6. After very great Storms of Wind, when the
“ Mercury has been low, it generally rises again
“ very fast.

“ 7. The more northerly Places have greater Al-
“ terations of the Barometer, than the more southerly.

“ 8. Within the Tropics, and near them, those
“ Accounts we have had from others, and my own
“ Observations at St. *Helena*, make very little or no
“ Variation of the Height of the Mercury in all
“ Weathers.

“ Hence I conceive that the principal Cause of the
“ Rise and Fall of the Mercury, is from the variable
“ Winds, which are found in the temperate Zone,
“ and whose great Unconstancy, here in *England*, is
“ most notorious.

“ A second Cause is the uncertain Exhalation and
“ Precipitation of the Vapours lodging in the Air,
“ whereby it comes to be at one Time much more
“ crouded than at another, and consequently heavier,

“ but

“ but this latter in a great Measure depends upon
 “ the former. Now, from these Principles, I shall
 “ endeavour to explicate the several *Phænomena* of
 “ the Barometer, taking them in the same Order I
 “ laid them down. Thus,

“ 1. The Mercury’s being low inclines it to rain,
 “ because, the Air being light, the Vapours are no
 “ longer supported thereby, being become specifically
 “ heavier than the Medium wherein they floated, so
 “ that they descend towards the Earth, and in their
 “ Fall, meeting with other aqueous Particles, they
 “ incorporate together, and form little Drops of
 “ Rain; but the Mercury’s being at one Time lower
 “ than at another, is the Effect of two contrary
 “ Winds blowing from the Place where the Baro-
 “ meter stands; whereby the Air of that Place is
 “ carried both Ways from it, and, consequently, the
 “ incumbent Cylinder of Air is diminished, and ac-
 “ cordingly the Mercury sinks: As for Instance, if
 “ in the *German* Ocean it should blow a Gale of
 “ westerly Wind, and at the same Time an easterly
 “ Wind in the *Irish* Sea; or if in *France* it should
 “ blow a northerly Wind, and in *Scotland* a south-
 “ erly; it must be granted, that that Part of the At-
 “ mosphere, impendant over *England*, would thereby
 “ be exhausted and attenuated, and the Mercury
 “ would subside; and the Vapours, which before
 “ floated in those Parts of the Air of equal Gravity
 “ with themselves, would sink to the Earth.

“ 2. The

“ 2. The greater Height of the Barometer is occasioned by two contrary Winds blowing towards the Place of Observation, whereby the Air of other Places is brought thither and accumulated ; so that the incumbent Cylinder of Air, being encreased both in Height and Weight, the Mercury pressed thereby must needs stand high, as long as the Winds continue so to blow ; and then the Air being specifically heavier, the Vapours are better kept suspended, so that they have no Inclination to precipitate and fall down in Drops, which is the Reason of the serene good Weather which attends the greater Heights of the Mercury.

“ 3. The Mercury sinks the lowest of all by the very rapid Motion of the Air in Storms of Wind. For the Tract or Region of the Earth's Surface, wherein the Winds rage, not extending all round the Globe, that stagnant Air which is left behind, as likewise that on the Sides, cannot come in so fast as to supply the Evacuation made by so swift a Current, so that the Air must necessarily be attenuated, when and where the said Winds continue to blow, and that more or less, according to their Violence : Add to which, that the horizontal Motion of the Air being so quick as it is, may, in all Probability, take off some Part of the perpendicular Pressure thereof ; and the great Agitation of its Particles is the Reason why the Vapours are dissipated, and do not condense into Drops, so as to
“ form

“ form Rain, otherwise the natural Consequence of
 “ the Air’s Rarefaction †.

“ 4. The Mercury stands the highest upon the
 “ easterly and north-easterly Wind, because in the
 “ great *Atlantic* Ocean, on this Side the thirty-fifth
 “ Degree of north Latitude, the Winds are almost
 “ always westerly or south-westerly ; so that, when-
 “ ever here the Wind comes up at East and North-
 “ East, ’tis sure to be checked by a contrary Gale as
 “ soon as it reaches the Ocean ; wherefore, accord-
 “ ing to what is made out in our second Remark,
 “ the Air must needs be heaped over this Island, and
 “ consequently the Mercury must stand high, as often
 “ as these Winds blow. This holds true in this
 “ Country, but is not a general Rule for others,
 “ where the Winds are under different Circum-
 “ stances ; and I have sometimes seen the Mercury

† The Reason the Doctor assigns for the sinking of the Mercury the lowest of all in violent Storms of Wind, seems not sufficient. Perhaps it may be better accounted for thus ; the Cause why the Wind blows at all, is in order to restore the *Æquilibrium* of the Atmosphere, when lost (~~as may be inferred from what was said in the first Note,~~) it therefore always blows towards that Point, where the Air is most rarefied and lightest. Now the Air, in its Progress to that Point, must certainly move faster and faster ; for the Cause, which gave it Motion at first, continues to act upon it all the Way. Consequently, in whatever Place the Wind blows with great Rapidity, that Place is at, or near the Point, where the Air is most rarefied, and lightest ; which is a sufficient Reason for the Mercury’s standing low at that Place.

“ here

“ here as low as twenty-nine Inches upon an easterly
 “ Wind, but then it blew exceeding hard, and so
 “ comes to be accounted for, by what was observed
 “ upon the third Remark.

“ 5. In calm frosty Weather the Mercury generally
 “ stands high, because (as I conceive) it seldom
 “ freezes, but when the Winds come out of the
 “ northern, and north-eastern Quarters ; or, at least,
 “ unless those Winds blow at no great Distance off :
 “ For the north Parts of *Germany, Denmark, Swe-*
 “ *den, Norway,* and all that Tract from whence
 “ north-eastern Winds come, are subject to almost
 “ continual Frosts all the Winter ; and thereby the
 “ lower Air is very much condensed, and in that
 “ State is brought hitherwards by those Winds, and
 “ being accumulated by the Opposition of the wester-
 “ ly Wind blowing in the *Ocean*, the Mercury must
 “ needs be pressed to a more than ordinary Height ;
 “ and, as a concurring Cause, the shrinking of the
 “ lower Parts of the Air into lesser Room by Cold,
 “ must needs cause a Descent of the upper Parts of
 “ the Atmosphere, to reduce the Cavity made by
 “ this Contraction to an *Æquilibrium*.

“ 6. After great Storms, when the Mercury has
 “ been very low, it generally rises again very fast : I
 “ once observed it to rise one Inch and a Half in less
 “ than six Hours, after a long continued Storm of
 “ South-west Wind. The Reason is, because the
 “ Air being very much rarefied, by the great Eva-
 “ cuations which such continued Storms make there-
 “ of, the neighbouring Air runs in the more swiftly,

“ to bring it to an *Æquilibrium*; as we see Water
 “ runs the faster for having a greater Declivity.

“ 7. The Variations are greater in the more north-
 “ erly Places, as at *Stockholm*, greater than that at
 “ at *Paris*, (compar'd by *M. Paschal*;) because the
 “ more northerly Parts have usually greater Storms
 “ of Wind than the more southerly, whereby the
 “ Mercury should sink lower in that Extream; and
 “ then the northerly Winds bringing the more dense
 “ and ponderous Air from the Neighbourhood of
 “ the Pole, and that again being checked by a south-
 “ erly Wind at no great Distance, and so heaped,
 “ must of Necessity make the Mercury in such Case
 “ stand higher in the other Extream.

“ 8. Lastly, this Remark, That there is little or
 “ no Variation near the *Equinoctial*, does above all
 “ others confirm the *Hypothesis* of the variable Winds
 “ being the Cause of these Variations of the Height
 “ of the Mercury; for, in the Places above-named,
 “ there is always an easy Gale of Wind blowing
 “ nearly upon the same Point, *viz.* east-north-east
 “ at *Barbadoes*, and east-south-east at *St. Helena*,
 “ so that, there being no contrary Currents of Air
 “ to exhaust or accumulate it, the Atmosphere con-
 “ tinues much in the same State: However, upon
 “ Hurricanes (the most violent of Storms) the Mer-
 “ cury has been observed very low, but this is but
 “ once in two or three Years, and it soon recovers
 “ its settled State, about $29\frac{1}{2}$ Inches.”

The following are Mr. *Patrick's* Observations on
 the rising and falling of the Mercury. They are very
 just,

just, and are to be accounted for on the same Principles with those of Dr. *Halley*.

“ 1. The rising of the Mercury presages in general fair Weather; and its falling, foul Weather; as Rain, Snow, high Winds and Storms.

“ 2. In very hot Weather, the falling of the Mercury foreshews Thunder.

“ 3. In Winter the rising presages Frost; and in frosty Weather, if the Mercury falls three or four Divisions, there will *certainly* follow a Thaw. But in a continued Frost, if the Mercury rises, it will *certainly* snow.

“ 4. When foul Weather happens soon after the falling of the Mercury, expect but little of it. And, on the contrary, expect but little fair Weather, when it proves fair shortly after the Mercury has risen.

“ 5. In foul Weather, when the Mercury rises much and high, and so continues for two or three Days before the foul Weather is quite over, then expect a Continuance of fair Weather to follow.

“ 6. In fair Weather, when the Mercury falls much and low, and thus continues for two or three Days before the Rain comes; then expect a great deal of Wet, and probably high Winds.

“ 7. The unsettled Motion of the Mercury denotes uncertain and changeable Weather.

“ 8. You are not so strictly to observe the Words engraved on the Plates (though, for the most Part, it will agree with them) as the Mercury's *Rising* and *Falling*: For if it stands at *Much Rain*, and
“ then

“ then rises up to *Changeable*, it presages fair Weather, although not to continue so long, as it would have done, if the Mercury were higher. And so on the contrary, if the Mercury stood at *Fair*, and falls to *Changeable*, it presages foul Weather; though not so much of it, as if it had sunk down lower.”

From these Observations, it appears, That it is not so much the Height of the Mercury in the Tube, that indicates the Weather, as the Motion of it up and down; wherefore in order to pass a right Judgment of what Weather is to be expected, we ought to know whether the Mercury is actually *Rising* and *Falling*; to which End, the following Rules are of Use.

1. If the Surface of the Mercury is convex, standing higher in the Middle of the Tube than at the Sides, it is generally a Sign that the Mercury is then rising.

2. If the Surface is concave, or hollow in the Middle, it is sinking. And,

3. If it is plain, the Mercury is stationary, or rather, if it is a little convex; for Mercury being put into a Glass Tube, especially a small one, will naturally have its Surface a little convex; because the Particles of Mercury attract each other more forcibly than they are attracted by Glass. Further,

4. If the Glass is small, or bent to an Angle, shake the Tube; and if the Air is grown heavier, the Mercury will rise about Half the tenth of an Inch higher, than it stood before; if it is growing lighter, it will sink as much.

F I N I S.



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